

09/733,392 & 90/005,710

05/09/05 Amendment

Remarks

Applicant requests favorable reconsideration of the Application. Applicant has amended the claims in a manner which is believed to respectfully traverse the Examiner's rejections under 35 U.S.C. § 112, as well as the Examiner's Objections. Language in the amendments to the claims is fully supported by the specification with no new matter added. Applicant has provided a Marked-Up set of claims and a Claim List - Status and Support of Current Amendment Changes. Additionally, Applicant provides the Declaration of David Breslin dated May 3, 2005, which is incorporated herein by reference, ("the Breslin Declaration") as additional support for the allowance of the pending claims. For the Examiner's convenience, the substance of the pending Office Action is set out below followed by Applicant's respective responses and remarks.

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Marked-up Set of Claims (According to 37 CFR 1.173(b)(2))

1. (Seven times previously amended) A method for dewatering biological sludge [that has been digested by] ~~from~~ a thermophilic digestion process, comprising:

a. adding a polymeric quaternary ammonium compound[s], as primary component, to the biological sludge; and

b. adding a polyacrylamide to the biological sludge;
such that any combination[s] of the polymeric quaternary ammonium compound[s] and of the polyacrylamide[s] enhance dewatering of the sludge.

2. (Six times amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound[s] ~~is~~[are from]~~of the~~ di-allyl di-methyl ammonium chloride (DADMAC) [family]~~variety~~.

3. (Seven times amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound[s] ~~is~~[are from] ~~of the~~ epichlorohydrin di-methyl amine (epi-DMA) [family]~~variety~~.

4. (Three times previously amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge; and _____
_____, upon]following the formation of microflocs of the sludge from ~~addition~~
of the polymeric quaternary ammonium compound, a cationic polyacrylamide is added[
to form a floc that dewateres the sludge].

5. (Three times previously amended) The method for dewatering biological sludge according to claim 4, wherein the polymeric quaternary ammonium compound and the cationic polyacrylamide are in an approximate[ly] 1:1 ratio, with the cationic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound[does].

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6. (Three times previously amended) The method for dewatering biological sludge according to claim 4, wherein the ratio[s] of [the]polymeric quaternary ammonium compound with respect to [the]cationic polyacrylamide range from about 1:10 to about 20:1.

7. (Twice previously amended) The method for dewatering biological sludge according to claim 4, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between about 50 ppm:1 percent and about 300 ppm:1 percent.

8. (Twice previously amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge, in an amount sufficient to cause formation of a cationic overcharge within a developed microfloc system, and wherein
the polyacrylamide is[and an] anionic[polyacrylamide is then added for
final floc formation].

9. (Cancelled)

10. (Three times previously amended) The method for dewatering biological sludge according to claim 8, wherein the polymeric quaternary ammonium compound and the anionic polyacrylamide are in a approximate[ly] 10:1 ratio, with the anionic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound[does].

11. (Original) The method for dewatering biological sludge according to claim 10, wherein the anionic polyacrylamide is about 40% anionic.

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12. (Three times previously amended) The method for dewatering biological sludge according to claim 8, wherein the ratio[s] of the polymeric quaternary ammonium compound to the anionic polyacrylamide ranges from about 1:10 to about 20:1.

13. (Three times previously amended) The method for dewatering biological sludge according to claim 8, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between approximately 50 ppm:1 percent and approximately 300 ppm:1 percent.

14. (Original) The method for dewatering biological sludge according to claim 1, wherein the biological sludge is mixed with primary sludge.

15. (Seven times amended) [A composition]The method for dewatering biological sludge according to claim 1, comprising:

a polymeric quaternary ammonium compound[s], as the primary component, [and] along with a cationic polyacrylamide;

said polymeric quaternary ammonium compound and cationic polyacrylamide[components] being present [in the composition in a ratio]to enable dewatering of the biological sludge[the composition to function as an agent for dewatering biological sludge from a thermophilic digestion process].

16. (Five times amended) The method for dewatering biological sludge according to claim 1, wherein one or both of the polyacrylamide and the polymeric quaternary ammonium compound[s] are used in solution, emulsion or in dry form.

17. (Cancelled)

18. (Cancelled)

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19. (Twice amended) The method of claim 1, wherein the polyacrylamide is cationic or anionic.

20. (Cancelled)

21. (Cancelled)

22. (Three times amended) A method for dewatering a sludge comprising water and solids, wherein the solids comprise thermophiles, the method comprising:

_____ contacting the sludge according to a technique selected from a group of techniques including:

_____ contacting the sludge with a polymeric quaternary ammonium compound along with a cationic polyacrylamide; and

_____ contacting the sludge first with a polymeric quaternary ammonium compound and then with a cationic polyacrylamide;

_____ to form a floc.

23. (Cancelled)

24. (Twice amended) The method of claim 22, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and the cationic polyacrylamide comprises a cationic polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

25. (Amended) The method of claim 22, wherein the polymeric quaternary ammonium compound is added in an amount sufficient to form microflocs of the thermophiles; and wherein

_____ the cationic polyacrylamide is added in an amount sufficient to agglomerate the microflocs into flocs for dewatering.

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26. (Three times amended) The method of claim 22, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

27. (Previously amended) The method of claim 25, wherein the ratio of the polymeric quaternary ammonium compound to the cationic polyacrylamide is in the range of about 1:10 to about 20:1.

28. (Twice amended) The method of claim 25, wherein the concentration of the polymeric quaternary ammonium compound and the cationic polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

29. (Twice amended) The method of claim 22, wherein the polymeric quaternary ammonium compound is added in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge, and wherein the polyacrylamide is anionic instead of cationic.

30. (Three times amended) The method of claim 29, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

31. (Amended) The method of claim 29, wherein the ratio of the polymeric quaternary ammonium compound to said anionic polyacrylamide is in the range of about 1:10 to about 20:1.

32. (Three times amended) The method of claim 29, wherein the total concentration of the polymeric quaternary ammonium compound and the anionic

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polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm;1 percent to about 300 ppm;1 percent.

33. (Twice previously amended) A method for dewatering a sludge comprising water and thermophiles, the method comprising:

adding to the sludge a polymeric quaternary ammonium compound.

34. (Three times amended) The method of claim 33, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight of greater than about 5,000,000.

35. (Twice amended) The method of claim 33, wherein the polymeric quaternary ammonium compound is added in an amount sufficient to form microflocs of the thermophiles.

36. (Three times amended) The method of claim 35, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

37. (Twice amended) The method of claim 35, wherein the concentration of the polymeric quaternary ammonium compound to the percentage of solids in the sludge is in the range of about 50 ppm;1 percent to about 300 ppm;1 percent.

38. (Three times amended) The method of claim 35, wherein the polymeric quaternary ammonium compound is added in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge, and wherein an anionic polyacrylamide is added for final floc formation.

39. (Cancelled)

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40. (Twice amended) The method of claim 38, wherein the concentration of the polymeric quaternary ammonium compound to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

41. (Three times amended) A sludge composition comprising:
_____ water;
_____ polyacrylamide comprising a cationic or an anionic moiety;
_____ a polymeric quaternary ammonium compound; and
_____ solids comprising thermophiles.

42. (Cancelled)

43. (Cancelled)

44. (Three times amended) The sludge composition of claim 41, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

45. (Twice amended) The sludge composition of claim 41, wherein the ratio of the polymeric quaternary ammonium compound to the polyacrylamide is in the range of about 1:10 to about 20:1.

46. (Twice amended) The sludge composition of claim 41, wherein the concentration of the polymeric quaternary ammonium compound and the polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

47. (Twice amended) The sludge composition of claim 41, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary

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ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

48. (Three times amended) A sludge composition comprising:

water;

polyacrylamide comprising a cationic or an anionic moiety;

a polymeric quaternary ammonium compound; and

solids comprising microflocs of thermophiles.

49. (Cancelled)

50. (Cancelled)

51. (Three times amended) The sludge composition of claim 48, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

52. (Twice amended) The sludge composition of claim 48, wherein the ratio of the polymeric quaternary ammonium compound to the polyacrylamide is in the range of about 1:10 to about 20:1.

53. (Twice amended) The sludge composition of claim 48, wherein the concentration of the polymeric quaternary ammonium compound and the polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

54. (Twice amended) The sludge composition of claim 48, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary

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ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

55. (Three times amended) A sludge composition comprising:

water;

polyacrylamide comprising a cationic or an anionic moiety;

a polymeric quaternary ammonium compound; and

solids comprising an agglomeration of microflocs of thermophiles.

56. (Cancelled)

57. (Cancelled)

58. (Three times amended) The sludge composition of claim 55, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

59. (Twice amended) The sludge composition of claim 55, wherein the ratio of the polymeric quaternary ammonium compound to the polyacrylamide is in the range of about 1:10 to about 20:1.

60. (Twice amended) The sludge composition of claim 55, wherein the concentration of the polymeric quaternary ammonium compound and the polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

61. (Twice amended) The sludge composition of claim 55, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary

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ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

62 – 66. (Cancelled)

67. (Amended) A sludge composition comprising:_____ water;_____ thermophiles; and_____ a polymeric quaternary ammonium compound.

68. (Three times amended) The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

69. (Amended) The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound is present in an amount sufficient for form microflocs of the thermophiles.

70. (Amended) The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound is present in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge.

71. (Three times amended) The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of at least about 5,000,000.

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72. (Previously added) The method of claim 22, wherein the polyacrylamide is cationic or anionic.

73. (Amended) The method of claim 33, wherein a cationic polyacrylamide is added.

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Claim List – Status and Support of Current Amendment Changes

| Claim | Status | Type | Support of Changes |
|-------|-----------|--------|--|
| 1 | Pending | Method | There are no changes in this amendment. |
| 2 | Pending | Method | "family of compounds" has been changed to "variety" - support is found in the abstract and col. 1 lines 10-17. |
| 3 | Pending | Method | "family of compounds" has been changed to "variety" - support is found in the abstract and col. 1 lines 10-17. |
| 4 | Pending | Method | There are no changes in this amendment. |
| 5 | Pending | Method | There are no changes in this amendment. |
| 6 | Pending | Method | There are no changes in this amendment. |
| 7 | Pending | Method | There are no changes in this amendment. |
| 8 | Pending | Method | There are no changes in this amendment. |
| 9 | Cancelled | N/A | N/A |
| 10 | Pending | Method | There are no changes in this amendment. |
| 11 | Original | Method | There are no changes in this amendment. |
| 12 | Pending | Method | There are no changes in this amendment. |
| 13 | Pending | Method | There are no changes in this amendment. |
| 14 | Pending | Method | There are no changes in this amendment. |
| 15 | Pending | Method | There are no changes in this amendment. |
| 16 | Pending | Method | "either" is removed; "or" is removed; and "emulsion" is added; the claim is amended to read "one or both of the polyacrylamide and the polymeric quaternary ammonium compound are used in solution, emulsion, or in dry form" - support is found in col. 7 line 49 - col. 9 line 49, along with col. 6 line 49 - 57 and col. 7 line 34 - 37. |
| 17 | Cancelled | N/A | N/A |
| 18 | Cancelled | N/A | N/A |
| 19 | Pending | Method | Repetition "of claim" is removed. |
| 20 | Cancelled | N/A | N/A |
| 21 | Cancelled | N/A | N/A |
| 22 | Pending | Method | "a polyacrylamide" is changed to "a cationic polyacrylamide" and "the polyacrylamide" is changed to "a cationic polyacrylamide" - support is found in the abstract; col. 5 lines 52-57; col. 6 lines 44-47; and col. 7 lines 4 through 20; and "that dewater well" is removed. |
| 23 | Cancelled | N/A | N/A |
| 24 | Pending | Method | "comprise a" is changed to "comprises a polymeric quaternary ammonium compound having a"; and "comprises a" is changed to "comprises a cationic polyacrylamide having a" - support is found in col. 5 lines 52-63; and col. 7 lines 11-14. |
| 25 | Pending | Method | "the polyacrylamide" is changed to "the cationic polyacrylamide" - support is found in the abstract; col. 5 lines 52-63; and col. 7 lines 11-14. |

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|----|---------|--------|---|
| 26 | Pending | Method | "family of compounds" has been changed to "variety" - support is found in the abstract and col. 1 lines 10-17; and "compound" has been inserted - antecedent basis. |
| 27 | Pending | Method | There are no changes in this amendment. |
| 28 | Pending | Method | "a" is changed to "the" - grammatical correctness; and "quaternary ammonium compound" is changed to "polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11; and "the" is inserted - antecedent basis. |
| 29 | Pending | Method | "Instead of cationic" is inserted - support is found in the abstract and in col. 6 lines 9-20. |
| 30 | Pending | Method | "family of compounds" has been changed to "variety" - support is found in the abstract and col. 1 lines 10-17; and "compound" has been inserted - antecedent basis. |
| 31 | Pending | Method | "the" is inserted for grammatical correctness and "the cationic" is changed to "said anionic" - support is found in the abstract and in col. 6 lines 9-20. |
| 32 | Pending | Method | "quaternary ammonium" is changed to "polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11; and "polyacrylamide" is changed to "anionic polyacrylamide" - support is found in the abstract and col. 6 lines 9-28; and "the" is inserted - antecedent basis. |
| 33 | Pending | Method | There are no changes in this amendment. |
| 34 | Pending | Method | "comprise a" is changed to "comprises a polymeric quaternary ammonium compound having a" - support is found in col. 5 lines 52-63. |
| 35 | Pending | Method | "polymer" is changed to "polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11. |
| 36 | Pending | Method | "quaternary ammonium compound" is changed to "polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11; and "family of compounds" has been changed to "variety" - support can be found in the abstract and col. 1 lines 10-17; and "compound" has been inserted - antecedent basis. |
| 37 | Pending | Method | "polymer" is changed to "the polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11. |

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|----|-----------|-------------|---|
| 38 | Pending | Method | "polymer" is changed to "polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11. |
| 39 | Cancelled | N/A | N/A |
| 40 | Pending | Method | "polymer" has been changed to "polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11. |
| 41 | Pending | Composition | "cationic or anionic" is changed to "a cationic or an anionic" - grammar. |
| 42 | Cancelled | N/A | N/A |
| 43 | Cancelled | N/A | N/A |
| 44 | Pending | Composition | "family of compounds" has been changed to "variety" - support is found in the abstract and col. 1 lines 10-17; and "compound" has been inserted - antecedent basis. |
| 45 | Pending | Composition | "sludge" has been changed to "sludge composition" - antecedent basis. |
| 46 | Pending | Composition | "sludge" has been changed to "sludge composition" - antecedent basis; and "quaternary ammonium compound" to "the polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11; and "the" is inserted - antecedent basis. |
| 47 | Pending | Composition | "sludge" has been changed to "sludge composition" - antecedent basis; and "comprise a" to "comprises a polymeric quaternary ammonium compound having a" - support is found in col. col. 5 lines 52-63; and col. 7 lines 11-14. |
| 48 | Pending | Composition | "cationic or anionic" is changed to "a cationic or an anionic" - grammar. |
| 49 | Cancelled | N/A | N/A |
| 50 | Cancelled | N/A | N/A |
| 51 | Pending | Composition | "family of compounds" has been changed to "variety" - support is found in the abstract and col. 1 lines 10-17. |
| 52 | Pending | Composition | "sludge" has been changed to "sludge composition" - antecedent basis; and "a" to "the" - antecedent basis. |
| 53 | Pending | Composition | "sludge" has been changed to "sludge composition" - antecedent basis; and "a" has been changed to "the" - antecedent basis; and "quaternary ammonium compound" to "the polymeric quaternary ammonium compound" - support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11-14; and "the" is inserted - antecedent basis. |

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|----|-----------|-------------|---|
| 54 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "comprise a" has been changed to "comprises a polyquaternary ammonium compound having a;" and "comprises a" has been changed to "a polyacrylamide having a" – support is found in col. 5 lines 52-63; and col.7 lines 11-14. |
| 55 | Pending | Composition | "cationic or anionic" is changed to "a cationic or an anionic" - grammatical correctness. |
| 56 | Cancelled | N/A | N/A |
| 57 | Cancelled | N/A | N/A |
| 58 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "family of compounds" has been changed to "variety" - support is found in the abstract and col. 1 lines 10-17; and "compound" is inserted – antecedent basis. |
| 59 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "a" is changed to "the" – antecedent basis; and "the" is inserted – antecedent basis. |
| 60 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "quaternary ammonium compound" has been changed to "the polymeric quaternary ammonium compound" – support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49 and col. 7 lines 11; and "the" is inserted – antecedent basis. |
| 61 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "quaternary ammonium compound" has been changed to "polymeric quaternary ammonium compound" – support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11; and "comprise a" has been changed to "comprises a polyquaternary ammonium compound having a" and "comprise a" has been changed to "comprises a polyacrylamide having a" – support is found in col. col. 5 lines 52-63; and col.7 lines 11-14. |
| 62 | Cancelled | N/A | N/A |
| 63 | Cancelled | N/A | N/A |
| 64 | Cancelled | N/A | N/A |
| 65 | Cancelled | N/A | N/A |
| 66 | Cancelled | N/A | N/A |
| 67 | Pending | Composition | There are no changes in this amendment. |

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|----|---------|-------------|--|
| 68 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "quaternary ammonium moiety" has been changed to "polymeric quaternary ammonium compound" – support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11; and "family of compounds" has been changed to "variety" – support is found in the abstract and col. 1 lines 10-17. |
| 69 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "polymer" has been changed to "polymeric quaternary ammonium compound" – support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11. |
| 70 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "polymer" has been changed to "polymeric quaternary ammonium compound" – support is found in the abstract in combination with col. 1 lines 9-16; col. 5 lines 62-66; col. 6 lines 9-28; col. 6 lines 44-49; and col. 7 lines 11. |
| 71 | Pending | Composition | "sludge" has been changed to "sludge composition" – antecedent basis; and "comprise a" to "comprises a polymeric quaternary ammonium compound having a" – support is found in col. col. 5 lines 52-63. |
| 72 | Pending | Method | There are no changes in this amendment. |
| 73 | Pending | Method | "claim 35" is changed to "claim 33" – support can be found in the abstract; col. 5 lines 52-63 and col. 7 lines 4-5. |

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Examiner's Remarks, Objections and Rejections with Applicant's Response**Certificate of Service**

USPTO records indicate that "JoAnn Villamizer" [sic, JoAnn Villamizar] is a patent attorney at Ciba Special Chemicals, the Third Party Requester.

Applicant's Response

Applicant will continue to copy JoAnn Villamizer on all communications made to the USPTO regarding this proceeding.

Response to Owner's Arguments**No motivation to combine prior art teachings**

Owner/applicant argues at page 13 that the "combination of references [sic, claimed invention?] would not have been obvious to one of ordinary skill in the art at the time of the invention." This articulation is taken as the argument that the prior art does not suggest combination of the various prior teachings relied upon by the examiner, rather than as the argument that if combined, the combined teachings would not teach or suggest the claimed invention as a whole.

Applicant's Response

Applicant apologizes to the Examiner for such wording in his response. Further, Applicant appreciates and agrees with the Examiner's correct interpretation of Applicant's argument.

Combined teachings are not enabling

Owner/applicant argues at page 13 that the "combination of references are not enabling and would require undue experimentation to reduce to practice." This argument is not persuasive at least for the reason that owner has not thoroughly analyzed the relevant prior art teachings under the factors set forth in Ex parte Forman (citation available upon request)

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Applicant's Response

Applicant understands and appreciates the Examiner's response to Applicant's arguments, and the Examiner's citation to Ex parte Foreman. Inasmuch as the Examiner "withdraws all prior-art based rejections," Applicant believes further response is unnecessary but reserves the right to further respond should presentation of the Ex parte Foreman factors be necessary in the future.

"Allyl"/DADMAC Family Rejections

Claims 2, 3, 26, 30, 36, 44, 51, 58, 68 are rejected under 35 USC Sec. 112 (2nd) for failing to particularly point out and distinctly claim the invention. The phrase "(DADMAC) family of compounds" cannot be understood because di-allyl di-methyl ammonium chloride is but one (and only one individual) compound, so speaking of a "family of compounds" makes no sense to the skilled artisan. ...

Applicant's Response

Applicant appreciates and understands the Examiner's rejection. To address the Examiner's rejections under Section 112 (2nd) paragraphs, Applicant has amended Claims 2, 3, 26, 30, 36, 44, 51, 58, 68 to read "variety" as follows:

2. The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is of the di-allyl di-methyl ammonium chloride (DADMAC) variety.

3. The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is of the epichlorohydrin di-methyl amine (epi-DMA) variety.

26. The method of claim 22, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

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30. The method of claim 29, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

36. The method of claim 35, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

44. The sludge composition of claim 41, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

51. The sludge composition of claim 48, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

58. The sludge composition of claim 55, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety.

68. The sludge composition of claim 67, wherein the polymeric ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety."

In all cases the term "family of compounds" has been replaced with the word "variety." As such, the Applicant respectfully submits that the claim amendments favorably overcome the Examiner's rejections under section 112, second paragraph.

The terms "DADMAC variety" and "epi-DMA variety" appearing in the claim amendments are supported from many locations of the specification, specifically:

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- "The primary component in the five versions is a polyquaternary amine, preferably of the di-allyl di-methyl ammonium chloride (DADMAC) variety and from the epichlorohydrin di-methyl amine (epi-DMA) variety." [Abstract]
- "Examples of polyquaternary ammonium compounds are the di-allyl di-methyl ammonium chloride (DADMAC) variety and the epichlorohydrin di-methyl amine (epi-DMA) variety." [Col. 1, lines 13 - 17]

Additional support for the use of the term "variety" in the amended claims stems from the Applicant's repeated disclosure of embodiments employing a "polyquaternary amine."

- "The primary component in the four versions is a polyquaternary amine." [Abstract]
- "Examples of polyquaternary ammonium compounds are..." [Col. 1, lines 13 - 17] and
- "The significant improvements of this invention in sludge dewatering are accomplished by the addition of polyquaternary amines to the sludge." [Col. 5, lines 2 - 4]

In no case has Applicant placed a restriction or a limitation on the "polyquaternary amine." Referring to Webster's Dictionary (1990), the word "example" is defined as:

- 1: one that serves as a pattern to be imitated or not to be imitated,
- 3: a particular single item, fact, incident, or aspect that is representative of all of a group or type,
- 4: a parallel or closely similar case esp. when serving as a precedent or model,
- 5: an instance (as a problem to be solved) serving to illustrate a rule or precept or to act as an exercise in the application of a rule

Applicant has repeatedly defined "preferred" embodiments of the polyquaternary amine to be "of the DADMAC variety" and "from the epi-DMA variety." **Applicant has not limited these preferred embodiments to DADMAC alone or to epi-DMA alone.** If Applicant had intended to limit its exemplary preferred embodiments to DADMAC alone, or epi-DMA alone, (which is not the case), Applicant would not have used the language "of the [] variety." AS such, contrary to the Examiner's contentions, Applicant's specification does not recite that "DADMAC" is the only possible preferred embodiment of a DADMAC variety, nor is "epi-DMA" the only possible preferred embodiment from an epi-DMA variety.

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The use of the language "of the variety" speaks to more than just a singular item. Applicant discloses these two preferred examples and uses the word (preposition) "of," and "from", e.g., "~~of~~ the DADMAC variety" and "~~from~~ the epi-DMA variety" to indicate that there are multiple types of each.

The Examiner appears to be attempting to interpret the phrase in the specification "The primary component in the five versions is a polyquaternary amine, preferably of the di-allyl di-methyl ammonium chloride (DADMAC) variety and from the epichlorohydrin di-methyl amine (epi-DMA) variety" to mean "preferably DADMAC and epi-DMA". The Examiner's interpretation is contrary to the plain meaning set out in the specification. Applicant used the word "variety" twice in this clause in conjunction with the word "preferably". As such, contrary to the Examiner's interpretation, the word "variety" used in conjunction with "of the DADMAC variety" indicates that Applicant is referring to varieties of DADMAC as preferred embodiments; similarly, the word "variety" used in conjunction with "from the epi-DMA variety" indicates that Applicant is referring to varieties of epi-DMA as preferred embodiments. All of these DADMAC varieties and epi-DMA varieties are in turn preferred polyquaternary amines.

Applicant's position is supported by the plain meaning of the word "variety", which according to Webster's Dictionary (1990), and as previously presented to the Examiner, means:

- 1: the ability or state of having different forms or types,
- 2: a number or collection of different things esp. of a particular class,
- 3a: something differing from others of the same general kind, and
- 3b: any of various groups of plants or animals ranking below a species.

Additionally, the Applicant's use of the prepositions "of" (typically meaning "derived or coming from") and "from" (typically meaning "as the source" or "out of") lend further support to Applicant's interpretation that: "of the DADMAC variety" does not just mean DADMAC and that "from the epi-DMA variety" does not just mean epi-DMA. One of Applicant's preferred polyquaternary amine embodiments is "of the DADMAC variety," inclusive of DADMAC not limited to DADMAC. Similarly, another of Applicant's preferred

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polyquaternary amine embodiments is "from the epi-DMA variety," inclusive of epi-DMA, not limited to epi-DMA.

As previously communicated to the Examiner, there exist many variants of the polyquaternary amine moiety. These variants are known in the art (e.g., Hassick '808 DADMAC variants noted by the Examiner and presented in the Breslin Declaration). DADMAC is but one of many potential polyquaternary amine moieties and DADMAC has many known variants "of the DADMAC variety". While DADMAC is a polyquaternary amine, DADMAC is only one of many polyquaternary amine moieties of the DADMAC variety; the same argument applies to variants from the epi-DMA variety.

Additionally, other areas of the specification support the Applicant's position.

- "It is to be understood that the descriptions of this invention are exemplary and explanatory, but are not restrictive, of the invention. Other objects and advantages of this invention will become apparent from the following specification and from any accompanying charts, tables, examples and drawings." [Col. 4, lines 37 - 42]
- "The present invention is described in connection with one or more preferred embodiments. However, it should be understood that the invention is not limited to those embodiments. In contrast, the invention includes all alternatives, modifications and equivalents as may be included within the spirit and scope of the specification and of the appended claims." [Col. 4, lines 54 - 61]
- "Certain objects are set forth above and made apparent from the foregoing description and examples. However, since certain changes may be made in the above description and examples without departing from the scope of the invention, it is intended that all matters contained in the foregoing description and examples shall be interpreted as illustrative only of the principles of the invention and not in a limiting sense. With respect to the above description and examples then, it is to be realized that any descriptions, drawings and examples deemed readily apparent and obvious to one skilled in the art and all equivalent relationships to those stated in the specification are intended to be encompassed by the present invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention. It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention

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herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall in between." [Col. 12, lines 54 - 61]

Further, as evidenced in the file history of Haase '435, the specification of the parent application, 08/721,557, makes the same presentations as in the '750. Specifically, in the '557 application page 2, lines 11 through 13 states:

"Examples of polyquaternary ammonium compounds are the di-allyl di-methyl ammonium chloride (DADMAC) variety and the epichlorohydrin di-methyl amine (epi-DMA) variety."

And, the abstract states:

"The primary component in the five versions is a polyquaternary amine, preferably of the di-allyl di-methyl ammonium chloride (DADMAC) variety and from the epichlorohydrin di-methyl amine (epi-DMA) variety."

Therefore, Applicant respectfully submits that the claims, as amended, are fully supported by the specification and that Applicant is not attempting to "broaden the claimed scope to include 'equivalents to DADMAC and Epi-DMA,'" as the Examiner contends. Rather, Applicant respectfully asserts that the scope of protection he seeks in the pending claims is already supported in the specification and makes sense to the skilled artisan. As detailed above, the amended claims are supported by the specification in many cited locations, and their scope is not subject to the narrow interpretation proffered by the Examiner. As such, Applicant respectfully submits that Claims 2, 3, 26, 30, 36, 44, 51, 58 and 68, as amended, are in condition for allowance.

Additionally, as further support for the pending claims 2, 3, 26, 30, 36, 44, 51, 58 and 68, Applicant provides the Breslin Declaration, in which Mr. Breslin states in part:

I have personal knowledge of industry capabilities and knowledge relating to the manufacture of variants of DADMAC and variants of Epi-DMA. Within this industry, there are easily manufactured equivalents which are known variants or variations to these chemistries. [Breslin Declaration at ¶4]

DADMAC is and has been commonly manufactured by the reaction of allyl chloride with a dimethyl (methyl-methyl) amine. Variations on this theme have been known by those of ordinary skill since the 1980's and can be easily manufactured, for example, by varying monomer chain length without changing the quaternization moiety. For example, the methyl-methyl amine could be methyl-

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ethyl amine or ethyl-ethyl amine, etc. Also, while not as easily accomplished, the chain length within the allylic moiety can be altered as well. [Breslin Declaration at ¶15 and some examples therein]

Epi-DMA is and has been commonly manufactured by the reaction of epichlorohydrin with a methyl-methyl amine. Variations on this theme have been known by those of ordinary skill since the 1980's and can be easily manufactured, for example, by varying monomer chain length without changing the quaternization moiety. For example, the methyl-methyl amine could be methyl-ethyl amine or ethyl-ethyl amine, etc. Also, the chain length within the epichlorohydrin moiety can be altered as well. [Breslin Declaration at ¶16 and some examples therein].

[T]o one of ordinary skill in the art, the term DADMAC family of compounds would also mean variations of DADMAC or "a group of things related by common characteristics" which are "composed of or resulting from separate elements," or more than one "closely related series of elements or compounds" which "involve or are used in combination." Further, a very similar communication is made by the term Epi-DMA family of compounds. [Breslin Declaration at ¶18 and some examples therein]

[T]o one of ordinary skill in the art, the term: "of DADMAC variety" would not be limited to DADMAC alone, "of epi-DMA variety" would not be limited to epi-DMA alone, "DADMAC family" would not be limited to DADMAC alone, "epi-DMA family" would not be limited to epi-DMA alone, "DADMAC family of compounds" would not be limited to DADMAC alone, and "epi-DMA family of compounds" would not be limited to epi-DMA alone. [Breslin Declaration at ¶17]

[T]o one of ordinary skill in the art, the term "DADMAC variety" would mean and would have meant in 1996, variations or "a quality or state of having different forms or types" or "a number or collection of different things esp. of a particular class" or "any of various groups of plants or animals ranking below a species" of DADMAC. Further, to one of ordinary skill in the art, the term "Epi-DMA variety" would mean variations or "a quality or state of having different forms or types" or "a number or collection of different things esp. of a particular class" or "any of various groups of plants or animals ranking below a species" of Epi-DMA. [Breslin Declaration at ¶19]

Applicant agrees with the Examiner that DADMAC itself is a single compound; however, the preferred DADMAC embodiment is not limited to DADMAC itself, but instead includes DADMAC and embodiments "of the DADMAC variety". Applicant also agrees with the Examiner that epi-DMA itself is a single compound; however, the preferred epi-DMA embodiment is not limited to epi-DMA itself, but instead includes epi-DMA and embodiments "from the epi-DMA variety". DADMAC variety and Epi-DMA variety are

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described as preferred embodiments, wherein DADMAC is a species within the genus "DADMAC variety" and epl-DMA is a species within the genus "epl-DMA variety."

Applicant appreciates the Examiner correcting Applicant's usage of organic chemical nomenclature; Applicant is aware of the corrections pointed out by the Examiner and apologizes to the Examiner for not being more precise.

Based on the foregoing, Applicant respectfully submits that the Examiner's claim rejections under section 112, second paragraph, has been respectfully traversed. As such, Applicant requests allowance of claims 2, 3, 26, 30, 36, 44, 51, 58 and 68 as amended herein.

Sec. 112(2nd) – Claim 16 – "either...and/or"

Claim 16 is rejected under 35 USC Sec. 112(2nd) for failing to particularly point out and distinctly claims the invention. ...

Applicant's Response

Applicant appreciates and understands the Examiner's rejection. Claim 16 has been corrected to read:

16. The method for dewatering biological sludge according to claim 1, wherein one or both of the polyacrylamide and the polymeric quaternary ammonium compound are used in solution, emulsion or in dry form.

Applicant apologizes for the grammatical error. Applicant further appreciates the direction provided by the Examiner. Claim 16, as amended, traverses the Examiner's rejection under section 112, second paragraph. As such, Applicant requests allowance of claim 16 as amended herein.

Sec. 112 (1st para) – lack of written description

Claim 16 is rejected under 35 USC Sec. 112 (first paragraph) for failure of the application to describe the claimed subject matter.

Claim 16 covers iner alia the situation in which in a sludge dewatering method, the polymeric quaternary ammonium compound and the polyacrylamide are both used in emulsion

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form. The original specification does not describe or support use of polymeric quaternary ammonium compound in emulsion form and polyacrylamide in emulsion form. With respect to the form of these materials, the application as filed appears to support use of a blend of polymeric quaternary ammonium compound and polyacrylamide in emulsion form. When individual polymers are used, i.e., quaternized polyacrylamide and cationic polyacrylamide, only the solution form and the dry form are described. See USP 5846435. Support for this "emulsion wording" could not be found "throughout examples, col. 7 line 49 – col. 9 line 49" as urged by owner applicant at page 14 of line 22 filed 4/4/04.

Applicant's Response

Applicant appreciates and understands the Examiner's rejection. Applicant agrees with the Examiner that the specification does, "support use of a blend of polymeric quaternary ammonium compound and polyacrylamide in emulsion form." In addition, though, Applicant believes that the specification supports the use of an individual polymeric quaternary ammonium compound in emulsion form with an individual polyacrylamide in emulsion form.

As presented previously and repeated herein for ease of review, Claim 16 has been amended to state:

"16. The method for dewatering biological sludge according to claim 1, wherein one or both of the polyacrylamide and the polymeric quaternary ammonium compound are used in solution, emulsion or in dry form."

Applicant wishes to present to the Examiner Example 4, col. 8 lines 24 through 34.

"EXAMPLE 4

A jar test was performed utilizing an electrical variable speed beaker stir system. 850 ppm of CV 5380 (Polyacrylamide with a DADMAC cationic comonomer) were added to about 500 ml of sludge from the thermophilic digestion system. The percentage of solids in the sludge was about 4.4 percent. The beaker was allowed to stir at 90 rpm for 15 seconds. At 15 seconds, the rpm was reduced to 30. The system was mixed for another 30 seconds. Small floc (e.g. with a diameter under about 3 mm) was formed with a very clean supernatant."

Therefore, Example 4 presents a single co-polymer of polyacrylamide and DADMAC. Applicant has included a technical data sheet for CV 5380, as CV 5380 was sampled in

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College Station, Texas in Example 4. Further, Applicant wishes to point out to the Examiner Col. 6 lines 49 through 57, which describe a quaternized polyacrylamide:

"The most preferred embodiment of the quaternized polyacrylamide used is: a copolymer of polyacrylamide with a cationic monomer that is quaternized in the polyacrylamide, the copolymer having a specific gravity of 1.2 at about 77 °F (25 °C.), a freezing point of approximately 23 ° F (-5 °C), viscosity of less than 1200 cps at about 40 °F (4.4 °C), an activity rate of about 38% and a flash point of about 275 ° F (135 °C.), (CV 5380)."

As is known by any skilled artisan, the above description is of an emulsion polymer.

Further, Example 5 demonstrates a lab test utilizing both an emulsion form of a polymeric quaternary ammonium compound (CV5380) with an emulsion form of a cationic polyacrylamide (CV 5120). Example 5 states:

"EXAMPLE 5

A bench test was performed utilizing a glass jar to mix the polymer with the sludge. 350 ppm of ClearValue CV 5380 (polyacrylamide with a DADMAC cationic co-monomer) along with 450 ppm of ClearValue CV 5120 (traditional polyacrylamide with a medium charge density) were added to about 100 ml of sludge from the thermophillic digestion system. The percentage of solids in the sludge was about 4.7 percent. The jar was gently shook for approximately 30 seconds. At 30 seconds, the results were observed. Large, strong floc (e.g. with a diameter of at least about 4 mm) was formed with a very clear supernatant.

Example 5 was repeated with varying cationic charge densities from the traditional polyacrylamide polymers. The best results were obtained with CV 5120.

A technical data sheet for CV 5120, as used in the testing at College Station is attached.

Applicant apologizes for the oversight and has modified the Claim List to include a reference to col. 6 lines 49 – 57."

Based on the foregoing, Applicant respectfully submits that the Examiner's rejection of claim 16 under section 112, first paragraph, has been respectfully traversed. As such, Applicant requests allowance of claim 16 as amended herein.

Dewatering, or Preparing for Subsequent (Unclaimed) Dewatering

Claims 1 – 16 are rejected under 35 USC Sec. 112 (2'nd) for failing to particularly point out and distinctly claim the invention. The claim is ostensibly directed to a method for

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dewatering sludge, but none of Claims 1 – 16 actually positively recites the step of dewatering sludge, i.e., the step of removing water from the sludge. It is not clear whether addition of these chemicals to a thermophilic biological sludge alone would constitute infringement, or whether one must follow-through with some degree of water removal or separation from the sludge in order to meet the implied limitation of dewatering that is suggested by the claim preamble. At best, the claims appear to be directed to preparing a sludge for subsequent dewatering through the addition of various dewatering chemicals and additives, such as a polymeric quaternary ammonium chloride compound and polyacrylamide.

Applicant's Response

Applicant understands and appreciates the Examiner's rejection. Claims 2 through 16 are all dependant upon claim 1, which states:

"1. A method for dewatering biological sludge from a thermophilic digestion process, comprising:

a. adding a polymeric quaternary ammonium compound, as primary component, to the biological sludge; and

b. adding a polyacrylamide to the biological sludge;

such that any combination of the polymeric quaternary ammonium compound and of the polyacrylamide enhances dewatering of the sludge."

Applicant agrees with the Examiner that the claims 1 – 16 are directed to a method for dewatering sludge. Applicant submits that it is known in the sludge treatment art that the term "dewatering sludge" implies at least "some degree of water [supernatant] removal or separation from the sludge [floc]," as recognized by the Examiner. (See, e.g., col. 7 lines 22 – 24 of the specification: "the strongest floc in combination with the cleanest supernatant are produced by method 4.") As such, the Applicant agrees with the Examiner that the term dewatering as used not only in the preamble of claim 1, but also in the last clause of claim 1, is interpreted to require "some degree of water removal or separation from the sludge." This interpretation is consistent with the specification, for example, in Examples 6 and 7, wherein dewatering is accomplished for example with the use of a centrifuge. Examples 6 and 7 state:

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"EXAMPLE 6

A plant test was performed on Sep. 10, 1996 at the municipal wastewater treatment facility for the City of College Station Texas. This facility has a thermophilic digestion system as designed by Kruger, Inc. The average temperature of the digester is usually near 149 °F (65 °C). Dewatering is accomplished on a Sharpels Polymixer 75000 centrifuge. Polymer inversion is accomplished on a Polymixer 500 which is designed for a dry polymer. Normal plant operation requires 1500 to 2000 ppm of Nalco 9909 obtaining variable sludge cake dryness, a final centrate that is usually much over 200 ppm of total suspended solid (TSS) and a plant throughput of 10 to 15 gpm sludge.

The centrifuge was started up on CV 5380 having a polymer concentration of 800 ppm and a plant throughput of 30 gpm. The sludge produced was low on cake solids obtaining an average near 12 percent. The centrate was 100 to 200 TSS with nearly all of the total suspended solid from small floc (e.g. of a diameter of less than about 1 mm) that survived the centrifuge. Even though this was an operational improvement, the floc produced was weak for the type of treatment incurred within the centrifuge.

EXAMPLE 7

A plant test was performed on Sep. 10, 1996 at the municipal wastewater treatment facility for the City of College Station Texas. This facility has a thermophilic digestion system as designed by Kruger, Inc. The average temperature of the digester is usually near 65 °C. Dewatering is accomplished on a Sharpels Polymixer 75000 centrifuge. Polymer inversion is accomplished on a Polymixer 500 which is designed for a dry polymer. Normal plant operation requires 1500 to 2000 ppm of Nalco 9909 obtaining variable sludge cake dryness, a final centrate that is usually much over 200 ppm of total suspended solid and a plant throughput of 10 to 15 gpm sludge. The centrifuge was started up on CV 5380 and Nalco 9909 with the CV 5380 having a polymer concentration of 400 ppm and the Nalco 9909 having a concentration of 450 ppm. The centrifuge was run between 45 and 55 gpm of sludge throughput. The produced sludge was over 18 percent cake solids. The centrate was less than 50 TSS."

See also, specification section "Summary of the Invention," col. 4 lines 9 - 14, states:

"The present invention relates to the dewatering of sludge from biological treatment systems of wastewater treatment facilities. Specifically, this invention is directed toward the removal of water from sludge that has been digested by a thermophilic digestion process."

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As such, there is no undclarity with respect to the use of the term "dewatering" in claims 1 - 16. See, e.g., *Boehringer Ingelheim Vetmedica v. Schering-Plough Corp.*, 65 USPQ2d 1961, 1964 - 65 (Fed. Cir. 2003).

Based on the foregoing, Applicant respectfully submits that the Examiner's claim rejection under section 112, second paragraph, has been respectfully traversed. As such, Applicant requests allowance of clalms 1 - 16 as amended herein.

37 CFR 1.173(d) Objection

Objection is made to Claim 15 under 37 CFR 1.173(d) for want of the words "a cationic" to be underlined. The phrase "a cationic" appearing in claim 15 (seven times amended) does not appear in claim 15 as issued and therefore must be underlined.

Applicant's Response

Applicant understands and appreciates the Examiner's objection. Applicant apologizes to the USPTO and the Examiner for that oversight. Claim 15, as amended and presented herein has underlined the words, "a cationic."

Based on the foregoing, Applicant respectfully submits that the Examiner's claim objection under 37 CFR 1.173(d) has been respectfully traversed. As such, Applicant requests allowance of claim 15 as amended herein.

Claim Objections

- a) Objection is made to Claim 19 for duplication of the phrase, "of claim" at line 1...
- b) Objection is made to Claim 30 for recitation of "consisting if"...
- c) Objection is made to Claims 34, 47, 54, 61 and 71 for recitation of "compound comprise a molecular weight of..." ...
- d) Objection is made to Claim 41 and 48 for recitation of "comprising cationic or anionic moiety" ...
- e) Objection is made to Claims 51 and 68 for recitation of "at least one selected" ...
- f) Objection is made to Claims 53, 60 for recitation of "wherein a concentration" ...
- g) Objection is made to Claim 59 for recitation of "wherein a ratio" ...

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Applicant's Responses

Applicant understands and appreciates the Examiner's Objections. Applicant has reworded:

- a) Claim 19 has been amended to state:

"19. The method of claim 1, wherein the polyacrylamide is cationic or anionic."

- b) Claim 30 has been amended to state:

"30. The method of claim 29, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety."

- c) Claim 34 has been amended to state:

"34. The method of claim 33, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight of greater than about 5,000,000."

And, claim 47 has been amended to state:

47. The sludge composition of claim 41, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

And, claim 54 has been amended to state:

54. The sludge composition of claim 48, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

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And, claim 61 has been amended to state:

61. The sludge composition of claim 55, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and the polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

And, claim 71 has been amended to state:

71. The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of at least about 5,000,000.

d) Claim 41 has been amended to state:

"41. A sludge composition comprising:
water;
polyacrylamide comprising a cationic or an anionic moiety;
a polymeric quaternary ammonium compound; and
solids comprising thermophiles."

And, claim 48 has been amended to state:

"48. A sludge composition comprising:
water;
polyacrylamide comprising a cationic or an anionic moiety;
a polymeric quaternary ammonium compound; and
solids comprising microflocs of thermophiles.

e) Claim 51 has been amended to state:

"51. The sludge composition of claim 48, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety."

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And, claim 68 has been amended to state:

"68. The sludge composition of claim 67, wherein the polymeric ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety."

f) Claim 53 has been amended to state:

"53. The sludge composition of claim 48, wherein the concentration of the polymeric quaternary ammonium compound and the polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent."

And, claim 60 has been amended to state:

"60. The sludge composition of claim 55, wherein the concentration of the polymeric quaternary ammonium compound and the polyacrylamide to the percentage of solids in the sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent."

g) Claim 59 has been amended to state:

"59. The sludge composition of claim 55, wherein the ratio of the polymeric quaternary ammonium compound to the polyacrylamide is in the range of about 1:10 to about 20:1."

Applicant thanks the Examiner for noting these objections. Based on the foregoing, Applicant respectfully submits that the Examiner's claim objections to claims 19, 30, 34, 47, 54, 61, 71, 41, 48, 51, 68, 53, 60 and 59 have respectfully been traversed. As such, Applicant requests allowance of claims 19, 30, 34, 47, 54, 61, 71, 41, 48, 51, 68, 53, 60 and 59 as amended herein.

"The" Cationic Polyacrylamide

Claims 25, 27, 29, 31 are rejected under 35 USC 112 (2'nd) for failing to particularly point out and distinctly claim the invention.

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The expression, "the cationic polyacrylamide." Recited in claim 27 lacks antecedent basis in claim 25 from which claim 27 depends. Antecedent basis is also not found in claim 22, from which claim 25 depends. Claim 22 is not rejected on this basis.

The expression, "the cationic polyacrylamide," recited in claim 31 lacks antecedent basis in claim 29 from which claim 31 depends. Antecedent basis is also not found in claim 22, from which claim 29 depends. Claim 22 is not rejected on this basis.

Applicant's Responses

Claim 22 has been amended to state:

"22. A method for dewatering sludge comprising water and solids, wherein the solids comprise thermophiles, the method comprising:

contacting the sludge according to a technique selected from a group of techniques including:

contacting the sludge with a polymeric quaternary ammonium compound along with a cationic polyacrylamide; and

contacting the sludge first with a polymeric quaternary ammonium compound and then with a cationic polyacrylamide;

to form a floc."

And, claim 25 has been amended to state:

"25. The method of claim 22, wherein the polymeric quaternary ammonium compound is added in an amount sufficient to form microflocs of the thermophiles; and wherein

the cationic polyacrylamide is added in an amount sufficient to agglomerate the microflocs into flocs for dewatering.

And, claim 27 remains to state:

"27. The method of claim 25, wherein the ratio of the polymeric quaternary ammonium compound to the cationic polyacrylamide is in the range of about 1:10 to about 20:1."

And claim 29 has been amended to state:

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"29. The method of claim 22, wherein the polymeric quaternary ammonium compound is added in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge, and wherein the polyacrylamide is anionic instead of cationic."

And, claim 31 has been amended to state:

"31. The method of claim 29, wherein the ratio of the polymeric quaternary ammonium compound to said anionic polyacrylamide is in the range of about 1:10 to about 20:1."

Based on the foregoing, Applicant respectfully submits that the Examiner's section 112, second paragraph, rejection to claims 25, 27, 29, and 31 have respectfully been traversed. As such, Applicant requests allowance of claims 25, 27, 29, and 31 as amended herein.

Compound/Moiety Antecedence

Claim 68 is rejected under 35 USC Sec. 112 (2'nd) for failing to particularly point out and distinctly claim the invention. The recited expression, "the quaternary ammonium moiety," lacks antecedent basis in claim 67. "[T]he quaternary ammonium compound" is suggested. Correction is required.

Applicant's Response

Applicant understands and appreciates the Examiner's rejection. Applicant thanks the Examiner for his suggestion. Applicant has amended claim 68 to state:

"68. The sludge composition of claim 67, wherein the polymeric ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety."

Based on the foregoing, Applicant respectfully submits that the Examiner's claim rejection according to section 112, second paragraph, to claim 68 has respectfully been traversed. As such, Applicant requests allowance of claim 68 as amended herein.

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Compound/Moiety Antecedence

Claims 69 – 70 are rejected under 35 USC Sec. 112 (2'nd) for failing to particularly point out and distinctly claim the invention. The recited expression, "the polymer" lacks antecedent basis in claim 67. "[T]he polymeric quaternary ammonium compound" is suggested. Correction is required.

Applicant's Responses

Applicant understands and appreciates the Examiner's rejection. Applicant has amended claims 67, 69 and 70 to state:

"67. A sludge composition comprising:

water;

thermophiles; and

a polymeric quaternary ammonium compound."

"69. The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound is present in an amount sufficient for form microflocs of the thermophiles."

"70. The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound is present in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge."

Based on the foregoing, Applicant respectfully submits that the Examiner's section 112, second paragraph, objection to claims 69 and 70 have respectfully been traversed. As such, Applicant requests allowance of claims 69 and 70 as amended herein.

Sludge/Sludge Composition Antecedence

Claim 68 - 71 are rejected under 35 USC Sec. 112 (2'nd) for failing to particularly point out and distinctly claim the invention. The recited expression, "the sludge" lacks antecedent basis in claim 67. "[T]he sludge composition" is suggested. Correction is required.

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Applicant's Responses

Applicant understands and appreciates the Examiner's rejection. Applicant has amended claims 67, 68, 69, 70 and 71 to state:

"67. A sludge composition comprising:

water;

thermophiles; and

a polymeric quaternary ammonium compound."

"68. The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of di-allyl di-methyl ammonium chloride (DADMAC) variety and epichlorohydrin di-methyl amine (epi-DMA) variety."

"69. The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound is present in an amount sufficient for form microflocs of the thermophiles."

"70. The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound is present in an amount sufficient to cause formation of the thermophiles into a developed microfloc system having a cationic overcharge."

"71. The sludge composition of claim 67, wherein the polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of at least about 5,000,000."

Based on the foregoing, Applicant respectfully submits that the Examiner's rejection per section 112, second paragraph, to claims 68, 69, 70 and 71 have respectfully been traversed. As such, Applicant requests allowance of claims 68, 69, 70 and 71 as amended herein.

Sludge/Sludge Composition Antecedence

Claims 22, 24 - 32, 72 are rejected under 35 USC Sec. 112 (2nd) for failing to particularly point out and distinctly claim the invention. These claims recite, "to form a floc that

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dewaterers well" (emphasis added). ... It is suggested that the expression "that dewaterers well" be deleted from claim 22.

Applicant's Response

Applicant understands and appreciates the Examiner's rejection. Applicant appreciates and will utilize the Examiner's suggestion. Applicant has amended claim 22 to state:

"22. A method for dewatering sludge comprising water and solids, wherein the solids comprise thermophiles, the method comprising:

contacting the sludge according to a technique selected from a group of techniques including:

contacting the sludge with a polymeric quaternary ammonium compound along with a cationic polyacrylamide; and

contacting the sludge first with a polymeric quaternary ammonium compound and then with a cationic polyacrylamide;

to form a floc."

Based on the foregoing, Applicant respectfully submits that the Examiner's objection to claims 22, 24 – 32, and 72 has respectfully been traversed. As such, Applicant requests allowance of claims 22, 24 – 32, and 72 as amended herein.

Claims Allowable Over Art

In reliance on Owner/Applicant's arguments of record, the examiner withdraws all prior art based rejections. That is, claims 1 – 8, 10 – 16, 19, 22, 24 – 38, 40 – 41, 44 – 48, 51 – 55, 58 – 61, 67 – 73 are not rejected over prior art. Of these, the claims that are not rejected or objected to on other grounds are allowable. For those claims which are objected to or rejected on at least one non-art basis, e.g., Sec. 112(2nd paragraph), the claims would be allowable if amended to overcome said at least one basis. Reasons for Indicating Allowable Subject Matter: The prior art of record fails to teach or fairly suggest the improved dewaterability of thermophilic bacterial sludges to which a polymeric quaternary ammonium sludge conditioner has been added, the nonobviousness of which improvement is supported in part by owner/applicant's material representation of

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"copying" of the claimed invention by at least one of owner/applicant's commercial competitors after the invention was – as represented – disclosed to it on November, 1996.

Applicant's Response

Applicant appreciates the Examiner's allowances. Further, Applicant appreciates the thoroughness and rigorousness of the Examiner's Work in this proceeding. To fully comply with the Examiner's Sec. 112 (2nd paragraph) rejections, Applicant has amended the claims affected by said rejections so as to comply with the Examiner. Further, Applicant has amended the claims affected by the Examiner's Objections so as to provide proper grammar as proffered by the Examiner in this proceeding.

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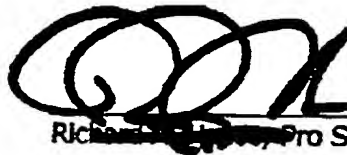
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Conclusion

Applicant respectfully requests entry of this amendment and the Breslin Declaration, along with favorable reconsideration of the pending claims. This amendment places the claims in a condition for allowance. The amendments to the claims do not raise any new matter issues and no additional searching would be required. Additionally, Applicant requests that in view of this fact, the amendment be entered, and after due consideration of the facts presented herein, the claims be allowed and a certificate be issued.

To facilitate the resolution of any issues or questions presented by this paper, Applicant respectfully requests that the Examiner directly contact the undersigned by phone to further the discussion, reconsideration and allowance of the claims.

Respectfully submitted,



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